ARES

Astromaterials Research and Exploration Science Directorate

Newsletter – August 2010

The ARES Newsletter is a snapshot of current events within the Directorate. Each newsletter highlights a small sample of the remarkable breadth and variety of the research activity and facilities in ARES and the people who do the work.
Send your Newsletter inputs and feedback to Greg Byrne.

In the News

Carbonate on Mars

Headlining this edition of the Newsletter is yet another success story from the amazing Mars Exploration Rover (MER) Program, with ARES scientists at the forefront. The research paper "Identification of Carbonate-Rich Outcrops on Mars by the Spirit Rover" was published in the journal *Science* (Vol 329, 23 July 2010, p. 421-424). ARES scientist **Dick Morris** is first author, with **Doug Ming** and **D.C. Golden** of ARES as coauthors. The paper describes their discovery of substantial carbonate mineral deposits in a rock outcrop on Mars from analysis of the MER *Spirit* data. So what? Well first, carbonates precipitate from water, and second, they are dissolved by acids; therefore, the existence of these carbonate deposits is hard evidence that the sample location was once wet with low exposure to acid – conditions most favorable for the emergence of life. The discovery will go down in history as the first of its kind on Mars. The entire story, with a behind the scenes look at how the discovery unfolded through several years worth of persistent, analytical detective work by Dick and his colleagues is found in this excellent article:
http://www.planetary.org/news/2010/0617_Mars_Exploration_Rovers_Special_Update.html

> The discovery of carbonate-rich deposits by Morris et al. is "*one of the top five findings of the entire* (MER) *mission*." – Steve Squyers, MER Principal Investigator.

The Geolab Meets Desert RATS

The Desert-Research and Technology Studies (D-RATS) 2010 field exercises begin later this month at the San Francisco Volcanic Field north of Flagstaff, Arizona. Several members of ARES will participate on the D-RATS science team, supported by over 25 scientists from other NASA centers and academia. The ARES team is integrating the operations practices of Apollo and the recent unmanned Mars missions, as well as lessons learned from Earth-analog simulations to work up a new approach for conducting and managing science operations for

future planetary missions. Front and center for this year's D-RATS exercise is the testing of JSC's Habitat Development Unit (HDU), a prototype for future human habitats on the Moon or Mars. In addition to living space, built into the HDU are work spaces, including the GeoLab; a geo-sciences work station where astronauts can perform initial analyses on collected rock and soil samples to help select those of highest value for transport to Earth.

GeoLab is the first of its kind for a field-based facility. It was developed and integrated into the HDU by ARES members **Cindy Evans**, **Mike Callaway**, **Mary Sue Bell,** and **Trevor Graf**. At the heart of the GeoLab work station is a customized glovebox with pass-through chambers for sample transfers from the outside to inside and ports for instruments for characterizing the samples. The field exercises will help define what instruments, or development thereof, are needed for astronauts to best perform basic astromaterials research while away from planet Earth.

Mary Sue, Cindy, and Mike in the HDU with the GeoLab glovebox next to Mike

Great Horned Owl Rescue

Thanks in large part to **Merrell Skipper**, three new Great Horned Owls live on at JSC. Merrell is a local JSC wildlife representative, certified last year as a Federally-Permitted Wildlife Rehabilitator. So, when injured or orphaned wildlife are found in the area, Merrell is often called in for rehab duty. Recently, Merrell helped care for three baby Great Horned Owls orphaned from the Bay Area. One of the owlets came from a nest blown down from JSC Building 10, and the other two owlets came from the Baytown area.

After rehabbing all three for two months, once their downy feathers were gone and they were flying well, the juvenile owls were then brought to JSC and placed in a small flight cage behind Building 267 (this picture shows two of the juveniles). **Alan Davis** in KX volunteered to repair and add some safety features to the flight cage so the owls would not injure themselves during their release transition. Merrell cage-fed the owls for three days before "hacking" them out, a lengthy process to familiarize the owls with the release area so they know to return for back-up food while learning to hunt on their own. Over the last few days of the process, the owls did not return - a good sign that they were on their own and found a place to call home.

Zero-g and Marco Feels Fine

It is not unusual for our people to do a little extra to accomplish the extraordinary, but **Marco Lozano** of the **Image Science and Analysis Group** (IS&AG) has taken going-the-extra-mile to

a new level. The IS&AG has been called upon by the Flight Operations Office for the C9 microgravity research and training aircraft (a.k.a. the "Weightless Wonder" or the "Vomit Comet") to analyze the dynamics of the C9 horizontal stabilizer and wings during its zero-g parabolic maneuvers. This would require someone to operate cameras onboard during flight to acquire the imagery needed for the analysis. Marco, who is often called upon for his high-speed camera expertise, underwent the Air Force Class III flight physical and the training for certification to fly on the C9.

After passing the extensive flight physical, Marco received classroom training on the various physiological hazards of flying in the Weightless Wonder – hypoxia, hyperventilation, decompression sickness, spatial disorientation, not to mention plain-old nausea. The final step in his certification was a half-day "ride" in a hypobaric chamber. Test subjects in the chamber are given 100% oxygen through a fighter pilot's mask for 30 minutes to rid their bodies of nitrogen, and the chamber pressure is reduced to an equivalent altitude of 25,000 feet. Then the subjects remove their masks and are asked to perform simple tasks. After a few minutes, the classic symptoms of hypoxia set in; light-headedness, disorientation, and numbness. Marco claims to have enjoyed the experience.

Marco recently completed the final step in his flight training process; a test flight in the C9 undergoing a series of 32 zero-g parabolas (he's experiencing zero-g in the photo). He's now ready to tackle the camera work needed for the C9 analysis, and IS&AG can add another unique analysis to its long list of accomplishments.

Congratulations are in Order

Director's Commendations

The Director's Commendation is JSC's highest award for civil servants and comes with an attractive, framed certificate. The recipients for 2010 include three of our esteemed ARES colleagues:

David "Duck" Mittlefehldt was recognized for *"outstanding contributions to planetary science achieved while simultaneously serving as a mission operator for the Mars Exploration Rovers and setting up a new, state-of-the-art laboratory for the microanalysis of astromaterials."*

Mark Matney was cited for his "*outstanding leadership in the development, implementation, and upgrade of an engineering model to predict the orbital debris environment in space.*"

And **Nancy Robertson's** commendation recognizes her "*outstanding leadership in coordinating Science Team grant funding for the Genesis Solar Wind Sample Return mission*."

NASA Honor Medals

Certificates are nice, but it's always great to bring home some "metal," a NASA Honor Medal, that is. The 2010 medal recipients include four more of our esteemed ARES colleagues:

Don Bogard, recently retired, received the NASA Exceptional Service Medal in recognition of his long and distinguished career at JSC.

Doug Ming also received the Exceptional Service Medal for his science and instrument leadership roles for the highly successful Mars Phoenix Lander mission.

Hauling in an Exceptional Achievement Medal is **Dick Morris** for his critical role in the success of the Phoenix mission through pre-launch calibration of the onboard science instruments.

And the ARES Director, **Eileen Stansbery**, received the NASA Outstanding Leadership Medal for her years of steady guidance for all of ARES.

Group Awards

Shuttle missions rarely come off completely as planned - often some problem crops up that requires an ad hoc workaround during the mission. STS-132 was no exception, and members of the **Image Science and Analysis Group** were recognized for their roles in a team effort to overcome a Shuttle hardware problem to ensure mission success. **Dan Smith** represented the group in accepting the team award.

Here is the citation: STS-132 Thermal Protection System (TPS) Inspection Workaround Team*:* "*For exemplary teamwork to assess, troubleshoot and work around a sensor package 1 cable problem affecting the ability to execute a nominal heat shield inspection of Atlantis."*

Also scoring NASA Honors for 2010 with Group Achievement Awards are: the **Hypervelocity Impact Technology Group "***for outstanding contributions to reduce risk to NASA crews and spacecraft from hypervelocity impacts of micro-meteoroid and orbital debris particles*"; and members of the **Orbital Debris Program Office** "*for outstanding contribution to determine the orbital debris risks to ISS and the STS-125 Hubble repair mission after the Iridium and Cosmos satellite collision.*"

Software of the Year

The Annual JSC Software of the Year Award winners were recently announced, and coming in third place for 2010 was our own **J.-C. Liou** for his lead role in the development of the Orbital Debris software model LEGEND (LEO-to-GEO Environment Debris). J.-C. shares the honors with former ARES member **Doyle Hall**. LEGEND is a high fidelity, three-dimensional numerical simulation model for long-term orbital debris evolutionary studies (it's really good).

Meteoritical Society Fellows

Being elected as a "Fellow" to any particular scientific Society is a bestowed honor that means you've made the grade – that in the eyes of your peers, you've distinguished yourself in that Society's field of scientific endeavor.

So it is with great pride that ARES can boast of three newly elected Fellows of the Meteoritcal Society – **John Jones, Scott Messenger,** and **Kevin Righter**. They join the ranks of several other distinguished ARES scientists previously elected as Fellows.

On the plethora of recent ARES awards and accolades - "*All of the awards are a testament to what a wonderful workforce we have. I am proud and honored to be a part of this outstanding organization*" – Eileen Stansbery, ARES Director.

Antarctic Service Medals

The United States Antarctic Service Medal is an award bestowed jointly by the National Science Foundation and the Department of Defense in recognition for service in Antarctica. The key word here is "in" Antarctica, as one criterion for the award is actual time spent on the continent in a research or support capacity.

For their key roles as members of the 2002-03 and 2004-05 Antarctic Search for Meteorites (ANSMET) field teams, respectively, **Scott Messenger** and **Keiko Nakamura** have only recently received their Antarctic Service Medals. We've also recently learned that Curation's **Bill Satterwhite** has been selected for the 2010-11 ANSMET field team. After his service, and if historical time scales hold, then Bill should be receiving his Antarctic Service Medal no earlier than about 2015.

Comings and Goings

Leslie Upchurch began work in the Shuttle Earth Observations Project 25 years ago as a high school student intern. Now, she moves on to the Land of (mailcode) OZ, otherwise known as the Office of the ISS Program Scientist, as their new Workflow Manager. We'll miss Leslie and wish her the best for new opportunities in the ISS Program.

Karen Mcnamara is off to NASA Headquarters for a one-year detail to the newly established Office of the Chief Technologist. Karen will assist that Office in coordinating and managing the multitude of new and existing technology development efforts across the Agency. We expect that upon her return to ARES, Karen will have set things straight in Washington D.C.

We welcome **Anthony Ferrel** to ARES as a Curation Technician. Anthony will be working in the Thin-Section Lab as well as in other curation labs maintaining the facilities and tools for astromaterials sample handling.

The Stardust and Cosmic Dust Labs welcome **Bradley De Gregorio**. Brad comes from the Naval Research Laboratory in Washington DC where he has worked since June of 2007. He is an alumnus of Arizona State University where he received his Ph.D. in 2006 and has spent the

past few years studying the structure and composition of Precambrian rocks, meteorites, and bits of comet returned by the Stardust mission.

Paul Abell joins the civil servant ranks of the KR Astromaterials Research Office this month. For the past several years, Paul has served as a research scientist detailed to ARES to lead studies examining all aspects of human exploration of Near-Earth Object asteroids. He will continue that work in his new position, and will generally serve as an internationally recognized "go to" person for developing plans for NASA's solar system exploration.

Sue Lederer has also joined ARES civil service as a new member of KX's Orbital Debris Program Office (ODPO). Sue will lead the continuing effort of optically measuring the orbital debris environment. She already has extensive experience in astronomical observations with a variety of telescopes around the world, so she should feel right at home with the all-night observing runs at places like the Cerro Tololo Observatory in Chile and with the ODPO's new Meter-Class Autonomous Telescope in the Pacific tropical paradise of Kwajalein Atoll.

We also welcome **John Gruener** to ARES as a transfer from the Constellation Program's Lunar Surface Systems Office. John has a long history with NASA in various capacities, including previously with ARES as a "space farmer" developing plant growth systems used in Shuttle flight experiments. He found his real niche in designing missions to the Moon and Mars and also as an Education Outreach specialist. So he joins the KX Human Exploration Science Office to help solidify ARES as a lead organization for defining space exploration objectives.